Modelling Dispositional Trust Amongst Financial Advisors

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1 Introduction

Today's business enterprises are complex systems, comprising many diverse interactions within and without. Such complexity makes the challenge of scenario planning a formidable one. Agent based modelling (ABM) is a technique, coming from complex systems theory, which attempts to provide quantitive assessment of scenario outcomes and finds use in many fields from ecology to the reinsurance industry.

Part of the difficulty of effective ABM is choosing the right level of detail. Particularly where human agents form a component of the model, a very wide range of options are available. The present project is based around data warehouse vendors and clients who use such data warehouses. Thus it presents the unique opportunity to drill down to almost any level of detail to continually refine and improve models as required.

One very interesting aspect of agent modelling is the notion of trust. Many studies have been carried out on simple trust systems such as Iterated Prisoners' Dilemna, while large tournaments have been organised for computer programs playing such games. Other simulations focus on trust in business negotiations in the buying and selling of goods, such as the simulations carried out by Nooteboom and colleagues. Trust is a key element to personal and business interactions and is now the subject of diverse research activity, from basic psychological studies, through modelling of online trust in domains such as EBay. Yet recent neuroeconomic evidence suggests that the decision to trust takes place deep inside an old part of the brain, the caudate nucleus [10]. Indeed, many animals develop trust, and even extraterrestials will develop trust given enough Smarties.

Human society has spawned many variants of this raw tendency to trust. Trust may exist in institutions (banks), through competency and position (doctors, accountants, lawyers) and through shared experience (divers, climbers). But all these variants build on the basic disposition to trust other people, *dispositional trust.*

In this paper we study dispositional trust amongst a homogeneous class of financial advisors and their clients. FPAs benefit from sharing information amongst their peers, from raw finanical data on equities and funds, through to sophisticated fiscal or legal analysis. On the other hand, there are disadvantages to sharing, since each FPA loses some of their individual competitive advantage by sharing. An intermediate position is where FPAs operate as teams. The evolution of agent teams is an interesting one, requiring maximum agent freedom while avoiding the tragedy of the commons [22].

2 Trust in the Business Environment

Trust is characterised by somebody adopting a strategy in which they make themselves vulnerable. In the case of the financial planning industry, where people's superannuation and other major life investments are critically dependent upon good decisions by the FPA [16, 17].

2.1 Trust in Relationship Marketing

Morgan and Hunt [15] show that trust is an essential element of successful business relationships. A variety of authors [7, 12, 5] have identified a number of distinct dimensions or types of trust:

1. *benevolence trust,* defined by Ganeson [5] as "the extent to which the retailer believes the vendor has intentions and motives beneficial to the retailer when new conditions arise"

2. *credibiliy trust,* defined as as "the extent to which the retailer believes that the vendor has the required expertise to perform the job effectively and reliably" [5]

3. *integrity trust,* the adherence to a set of principles acceptable to both sides of a relationship [12]

4. *dispositional trust,* defined as "the extent to which one displays a consistent tendency to be willing to depend generally on others across a broad spectrum of situations and persons" [14]and is closely related to benevolence, capturing the mindset of the trustee [8] and their development experience [18]

5. *abilitiy trust,* defined by Mayer [12] as "that group of skills, competencies and characteristics that enable a party to have influence within some specific domain" and relates to perceived confidence, through status within an organisation, formal qualifications and other "league tables" of success and reputation.

6. *institutional trust,* defined by as "one believes the needed conditions are in place to enable one to anticipate a successful outcome in an endeavour or aspect of one's life [13] and is tied according to Zucker [23] to clearlgy defined societal roles such as medical doctor, lawyer, hospital, insurance company) or professional membership.

7. *search, or referral, trust,* through recommendations and referrals [6], particularly important in the FPA context and a major theme of the simulations of this paper. Such referral trust becomes important when clients have not had sufficient experience of an organisation [11, 20, 7].

2.2 Organisational Culture

A second dimension to trust in the financial planning industry is the trust amongst financial planners themselves. This is strongly dependent upon their organisational culture, where they are part of a larger organsiation, such as a major bank. The definition of culture is a complex one, but basically refers to the sharing of mindsets amongst organisational members, such as their values, ideas, beliefs and practices [1]. In turn the collective awareness of a shared culture provides norms for behaviour within the organisation [4]. Thus the relationship between FPAs, the extent to which they will share information about financial products and resources and amount client needs is strongly influenced by organisational culture. In particular, shared information can reduce the need for research and also allow specialisation amongst advisors, thus leading to greater efficiency.

But culture also impacts on customer relationship management as shown in a qualitative study by Jarratt and O'Neill [9]. Organisational cultures with an aggressive, competitive attitude are less likely to develop trusting relationships with their clients. Thus institutional trust relates also to expectations of an institution's behaviour, and membership sub-cultures [23] and reputation [11]. We argue that as the FPA and consumer interact in the early stage of the relationship the consumer's trust is *reinforced* [21, 14]. as they make assessments about their FPA's characteristics, of ability, benevolence, judgement and character, and that these lead to favourable categorisation. Thus, the consumer's categorisation and FPA's trustworthy characteristics work together moving the consumer from preconception trust to the next stage of the trust life-cycle, which is reinforced trust.

The following simulation models some of the dimensions of reinforced trust. The simulation tests the role of benevolence when the FPA is under personal financial pressure. Credibility is examined in the context of referral trust options and commitment is shown under conditions of changing trust levels.

3 The Model

When numerous intelligent or adaptive agents interact (in this case people) complex systems arise with unexpected *emergent* behaviour [2]. Thus we aim to simulate the interactions between clients, clients and FPAs and the FPAs themselves and to relate how the development or loss of trust impacts on client/FPA wealth and the extent to which clients switch FPAs (client churn).

The simulation has three basic entities:

1. the *market* consists of a simple stock exchange featuring equities and funds based on them, which we call, simply, the market;
2. the *clients* buy and sell on the stock exchange through the use of FPAs.
3. the *financial planning advisors* (FPA) buy and sell on the market.

In an earlier study [3] we examined the nature of trust between clients and FPAs. The present work improves the interaction between clients and FPAs, through taking into account the client's risk profile, and introduces a model for the interaction between FPAs. The role of dispositional trust, client for FPA, and FPAs for each other is studied under a variety of conditions.

3.1 The Market

The fundamental entity of the market is the equity, of which there are N (say 100). Each entity has a growth curve and associated noise (volatility) about that curve. The essence of good investment is in choosing the right equities at the right time. In this simulation we study the role of dispositional trust, ζ, in sharing of information about equities. An FPA may advise a client to purchase equities on a fee for service basis. Once the client has made the purchase, the FPA receives no further income until the point of sale. A global table, accessible to all FPAs, gives the growth rate, g_i and the variance in price at each time step, σ_i for each equity i.

Built on top of the equities are a number of funds. Each fund is composed of a number of equities and grows in value along with them. A client will normally be rewarded with a steady, safer, but lower growth, through purchase of a fund. Following typical financial markets a fund has the following fees:

1. the *entry fee*, f_e which is often waived by FPAs. Its value is typically 3–5%.
2. the *management fee*, f_m which is a composite of numerous elements, and is paid by the client from their investment. Its overall value is between 1 and 4%.
3. the *trailing commision*, f_c, which is paid to the FPA. Its value is typically less than 1%.

FPAs will typically study the fine details of equities and pick those which they think will provide the best return against different time scales. To capture this element of research, requires a simplifying heuristic. The strategy we adopt herein is to model the equity's value, v, over time t, on a nonlinear equation, say, a quadratic

$$v = v_0 + gt + \phi t^2$$

where ϕ is an unknown parameter and v_0 is the value at time $t = 0$. To this basic trend is volatility is added as normally distributed noise, with variance set to the mean of the current value.

Knowledge of ϕ is extremely valuable, and it is this knowledge that FPAs can share with each other.

Unfortunately, no equity has guaranteed growth forever. If this were the case, the FPAs would simply recommend their best equity to every client. Thus we need one more factor, the risk of a crash, r, in which the value of the equity falls by a big factor or the ϕ value falls, causing a negative change in growth.

3.2 The Clients

The clients are naive investors, relying totally on FPA advice. The client model is essentially unchanged from the earlier simulation [3]. The decision to trust is a low-level mechanism, taking place in an area, the basal ganglia (caudate nucleus) outside the cerebral hemispheres, recently the topic of neuroeconomic investiation. King-Casas et al. [10] found that the best predictor of trust, correlating with fMRI imagery, was the difference in investment change for for a new transaction in round j, ΔI_j and the change in repayment between rounds, $j-1, j$, ΔR_j. This neuroeconomic result forms the basis for calculating the clients trust and investment at each round. Each client has a caution level and a level of trust in the FPA. Clients are connected by a small-world network and share trust of their FPA with their neighbours. If their trust falls to a sufficiently low value, they may decide to switch. They then select a new FPA based upon value from their neighbours, of if their neighbours also have low trust, the select a new FPA at random.

3.3 FPAs without Learning or Sharing

In this version, we do not allow the FPAs to change policy during a single simulation, and look for which FPAs have performed best over a run. We then see if there is any common pattern to the successful FPAs. The next version could put the FPA parameters for each run under evolutionary optimisation.

There are two sets of parameters to consider: the FPA fee structure and their decision making process.

3.3.1 The Fee Structure

There are two cases:

1. Investment in the fund. There is no charge, fees accruing from trailing commission, maximum value, $f_c^{(max)}$.

2. Investment in equities. The charge, f, is

$$f = f_0 + \alpha I$$

   where f_0 is a fixed consultation charge, α a scaling factor on the investment I. How do we scale this? The FPA has a time horizon to break even on equity versus funds, say T_{even}.

$$\alpha = f_c^{(max)} T_{even} - f_0/I$$

   . The maximum value of f_0 we should probably just choose arbitrarily, say, 10% of timestep income and each FPA gets a uniformly distributed random value over this range.

3.4 FPA Decisions

The FPA has to first decide how much to put into equities and funds and then how to choose each.

- The FPA always puts a fraction ξ into funds. The remainder which goes into equities depends upon the client caution, c. So the fraction which goes into funds, I_{fund} is

$$I_{fund} = I(\xi + (1 - \xi)c)$$

- The FPA has a minimum acceptable trailing commission, $f_c^{(min)}$ and chooses the highest growth funding meeting this level

- The current growth rate.g_c of any equity is given by

$$g_c = g + 2\phi t$$

  The FPA selects the highest current growth equity.

At the beginning of each cycle, the FPA may choose to buy research on an equity. The research cost is fixed across all FPAs for the whole of the simulation. The FPA has a research propensity, p_{res} which is used to determine at each time step from a random number, if the FPA buys research, assuming that they have enough money.

3.5 FPA Information Sharing

When research costs are high, FPAs may benefit from sharing information amongst each other. When they act as individuals, sharing reduces their competitive edge, but if they are part of a team, as for example the FPA teams maintained by banks, then they may receive part of their rewards from overall team performance.

Neuroeconomic literature [10] suggests that we rank the payments that FPAs can make to each other. In this case the crucial information about equities is the ϕ value which determines the long term growth. The FPA's trading elements are ϕ values, the larger the more valuable. Thus an FPA can estimate the value of an exchange (and hence level of trust) from the relative ranking of the values it divulged versus those it received in return.

4 Data Mining of Model Parameters

Each of the parameters of the simulation is amenable to quantification and matching to real world behaviour through data mining. In some cases the requirements are straightforward such as the cost of research. The market can be made arbirarily complex by reference to the real stock market and associated funds and equities.

In other cases, more detailed research is required to adequately formulate the data mining questions, such as the measurement and properties of organisational culture. This is an area of ongoing qualitative research within the project

5 Results

The simulation was implemented in RePast, one of the popular agent based modelling packages [19]. Figures 1,2, 3 and 4. illustrate the general trends in growth of wealth, trust and client for four simulations using different random initialisation values for FPA strategies, client caution and initial trust. The average values exhibit fairly common overall patterns, suggesting relative insensitivity to the parameters.

Study of the individual FPAs shows that equities rather than funds tend to be favoured in the existing model. The more successful FPAs seem to have lower client churn as shown in figures 7, 7, 5 and 6.

6 Discussion

The results obtained so far from the simulation suggest that the most successful FPAs favour equities over funds. Where research costs are set to be low, then research is favoured, but this seems to be a weaker effect than the propensity for equities over funds. The best FPAs have low client churn and therefore higher levels of maintained trust.

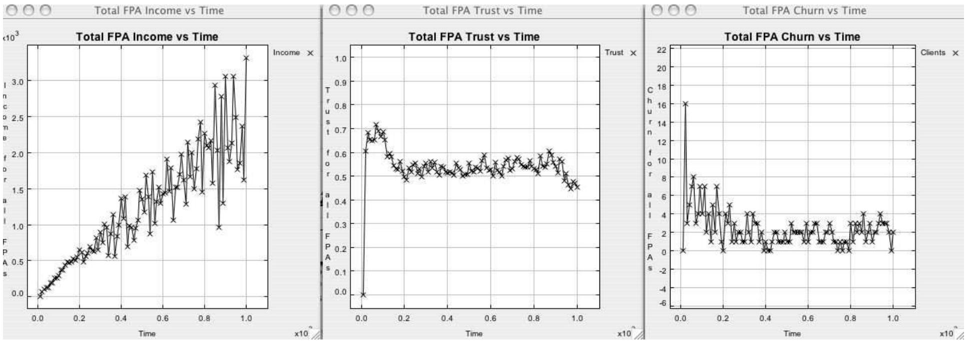

Figure 1: General Trend Example 1

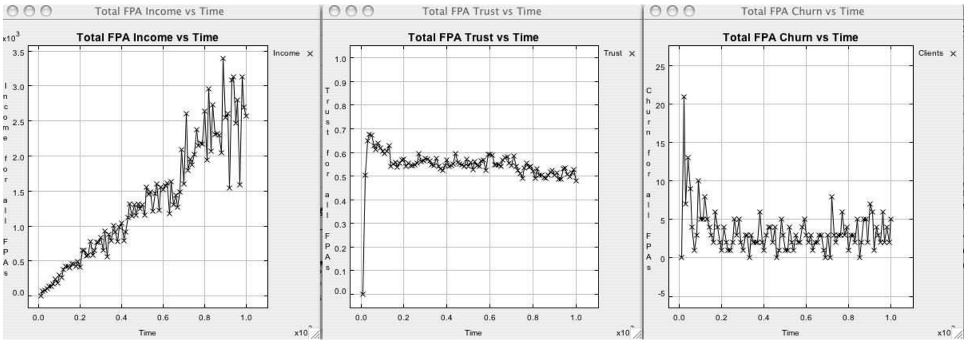

Figure 2: General Trend Example 2

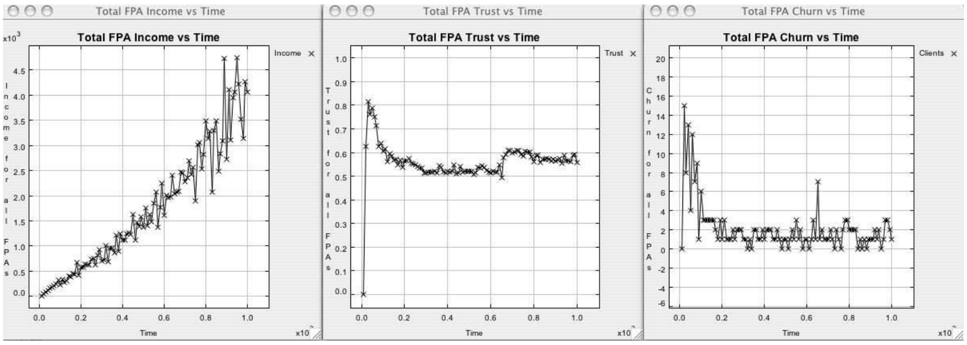

Figure 3: General Trend Example 3

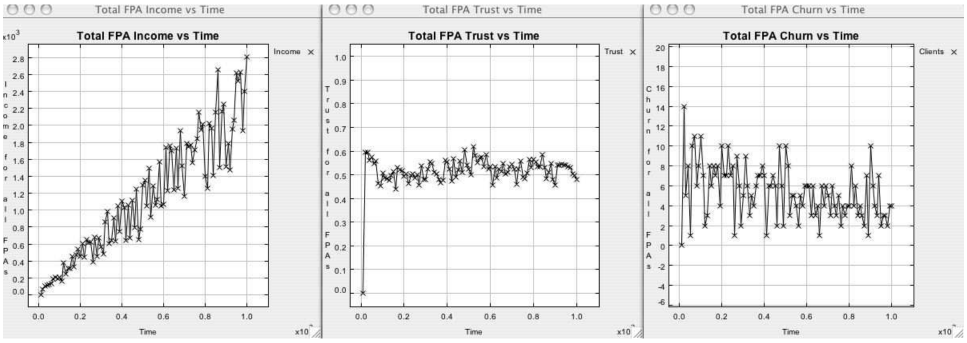

Figure 4: General Trend Example 4

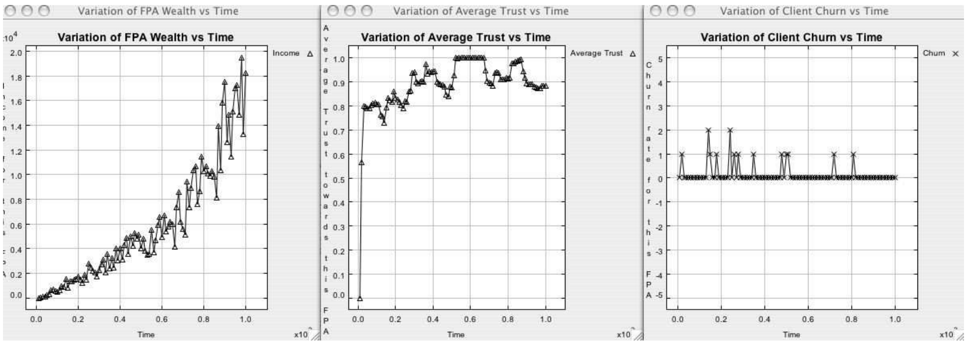

Figure 5: Good FPA Example 1

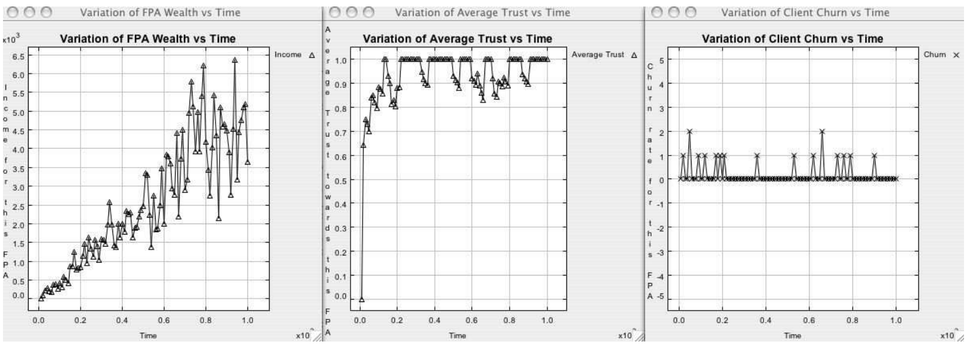

Figure 6: Good FPA Example 2

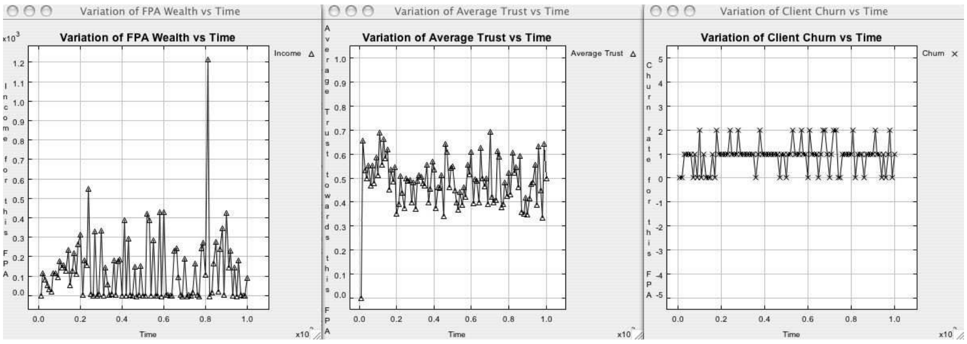

Figure 7: Bad FPA Example 1.

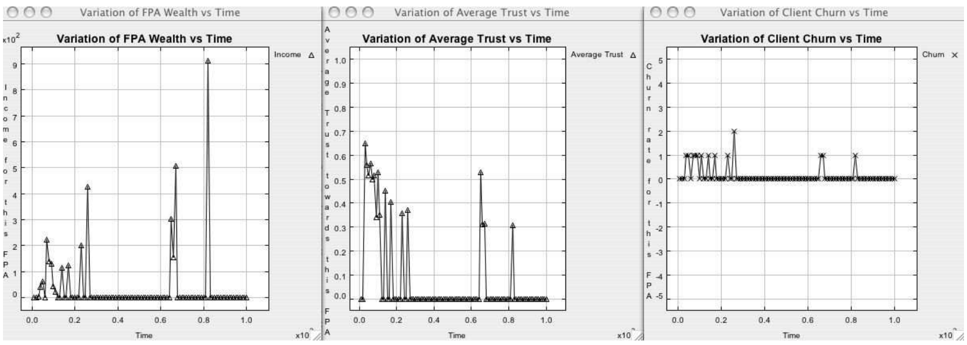

Figure 8: Bad FPA Example 2.

The next stage of the simulation is to study the effects of inter-FPA trust. At present the range of FPA strategies seen are just those obtained from random initialisation. In the next level of the simulation, the FPA strategies will be put under evolutionary control, to optimise their strategies in competition with one another.

The final, extensive, phase is the integration of data mining tools to find real world parameter values for client and FPA strategies. At this point we shall be approaching the engineering practice of design and development by computer simulation.

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